



ASML

Containing the Supply Chain Impact of Japan Earthquake

Harrie de Haas, ASML, Global Logistics Services

eSCF 22 nov. 2011, Risk & Resilience in the Supply Chain

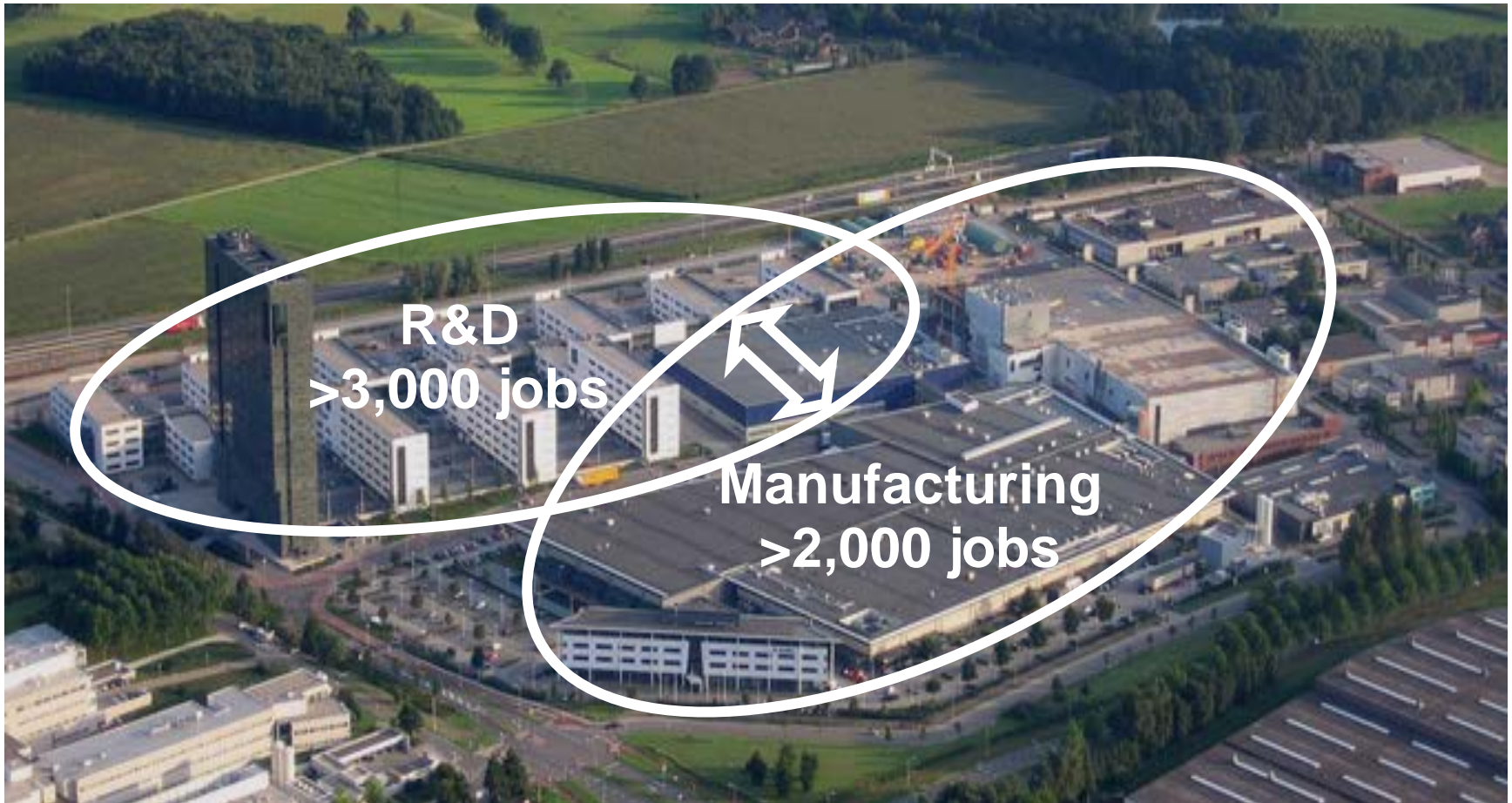
A close-up photograph of a highly polished, curved metallic surface, likely part of a precision instrument or machine. The surface reflects light, creating bright highlights and soft shadows. A small, cylindrical metallic component is visible on the right side, and a black rectangular feature is on the left. The background is blurred, showing more of the same metallic structure.

Introducing ASML

ASML Headquarters in Veldhoven

2011 sales EUR 5.5 billion*, profit margin >20%, 10,000 jobs

Manufacturing in the Netherlands, service centers in 16 countries



*Company guidance per October 2011

Slide 3 |



ASML

A detailed, close-up photograph of a precision lithography machine component, likely a lens or stage assembly, showing intricate mechanical details and a polished metallic surface. The image is oriented diagonally, creating a sense of depth and precision.

ASML's Mission

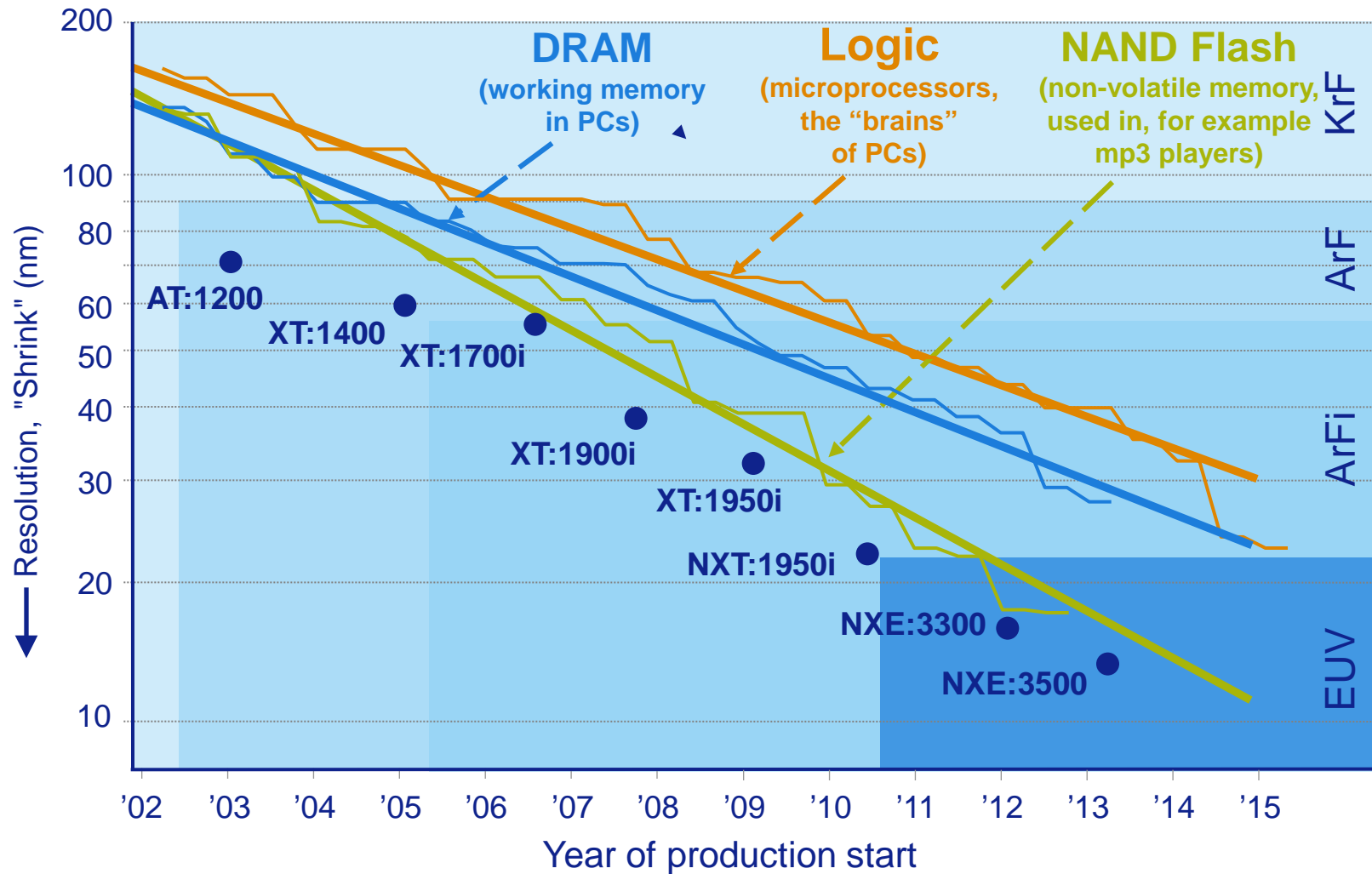
Providing leading-edge imaging solutions
to enable the semiconductor industry



ASML

Enable the Semiconductor Industry.....

Shrink and double features on chip every 2-3 years (Moore's Law)



Process development 1.5 ~ 2 years in advance. Updated Q1, 2010
Based on input multiple customers.

Slide 5 |



ASML

27 Years of powering the “global electronics revolution”

Company (> 5,000 employees) R&D per employee (€)

ASML (semiconductors) **78,000**

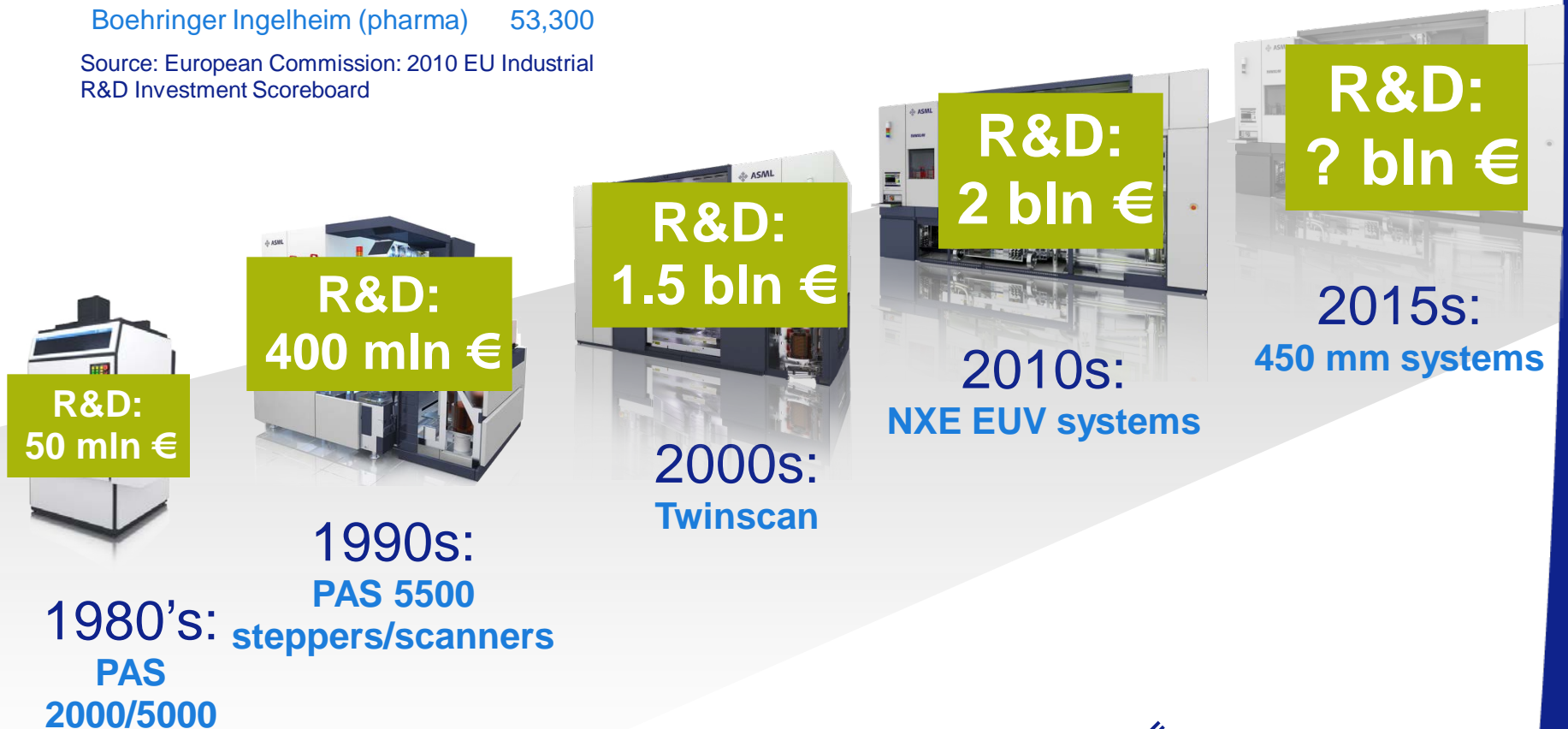
Lundbeck (pharma) 71,700

Porsche (automotive) 58,100

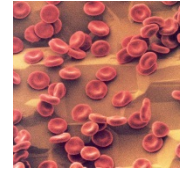
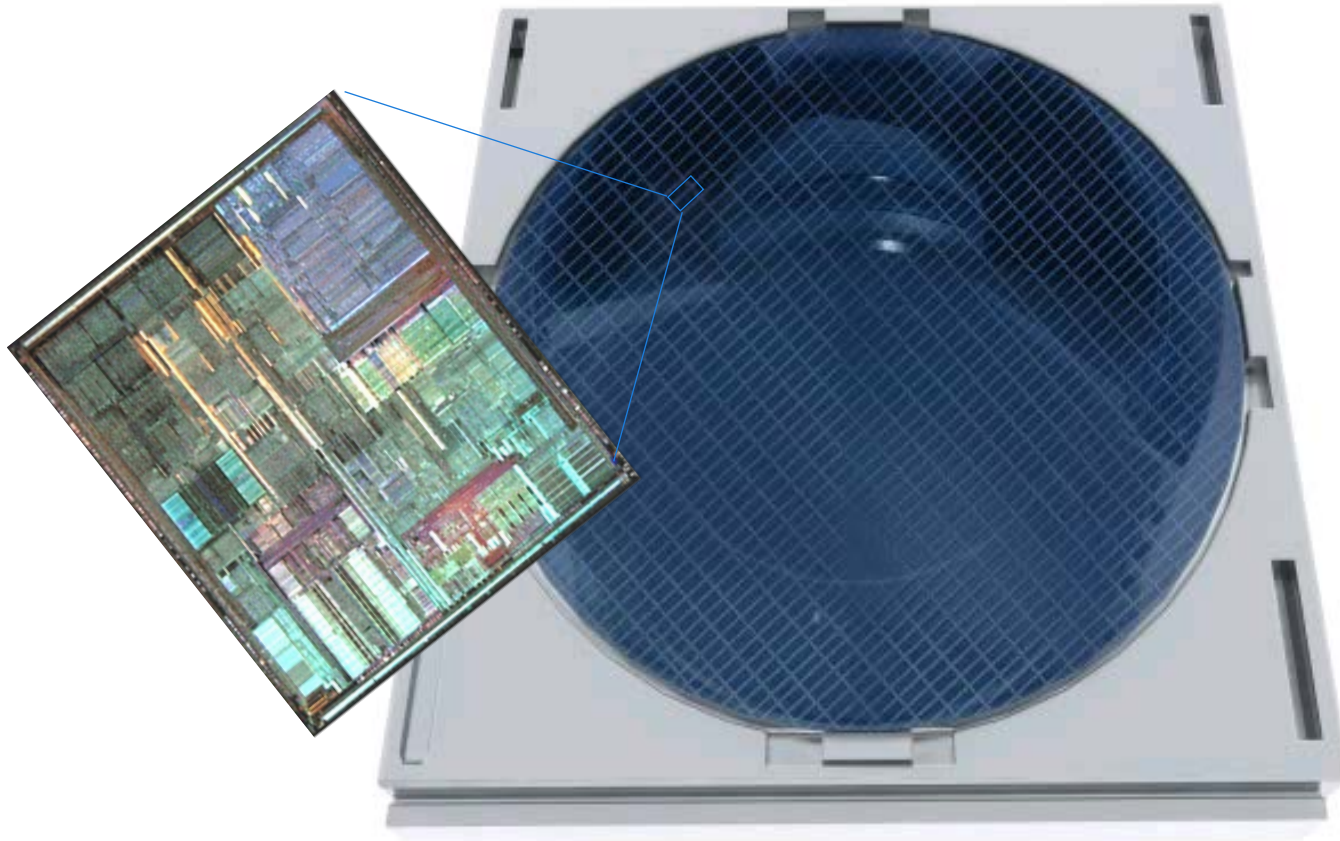
UBIsoft Entertainment (software) 54,400

Boehringer Ingelheim (pharma) 53,300

Source: European Commission: 2010 EU Industrial
R&D Investment Scoreboard



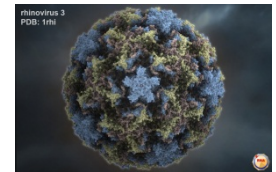
Positioning billions of virus-sized features per second



Red bloodcell:
7,500nm

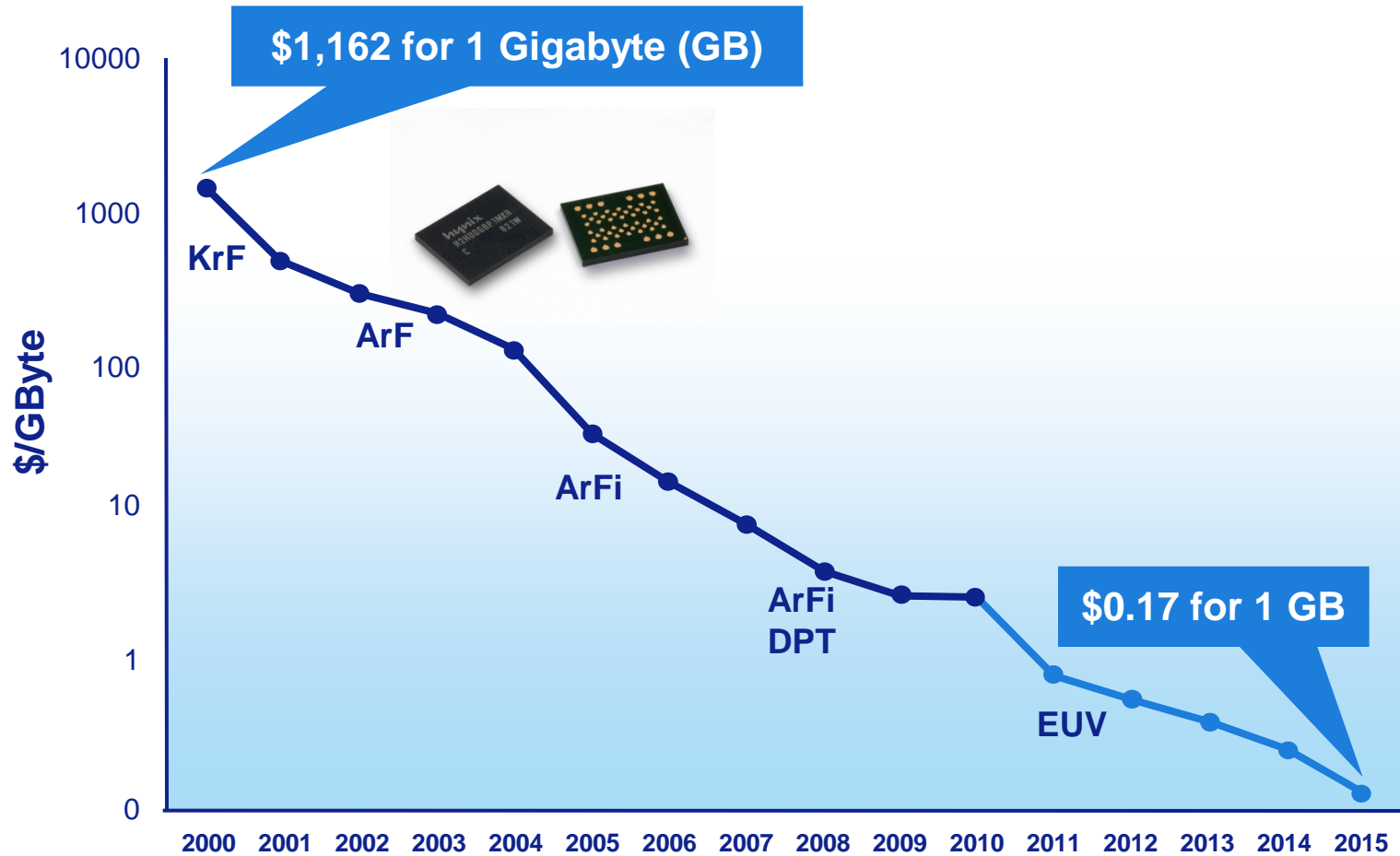


Bacteria: 800
to 1,000nm



Rhinovirus:
20nm

The economic benefit of shrink



Historical NAND flash price and forecast

Source: Gartner 2011

Slide 8 |



ASML

Shrink means doing more with less



1976

Cray 1: The first supercomputer

- 8 megabytes of memory
- 5.5 tons
- 150 kilowatt power supply
- “Innovative Freon cooling system”
- \$8.8 million (\$30 million in today’s dollars)

Shrink means doing more with less



The supercomputer in your pocket:
a fraction of the
materials,
price,
power consumption

1976



2011





Introducing ASML

Dependencies in the Value Chain

Lithography is at the heart of chip manufacturing

ASML Leads in 1H 2011

TOP EQUIPMENT SUPPLIERS 1H 2011

(worldwide IC mfg equipment & service sales, \$M)

COMPANY	1Q'11	2Q'11	1H'11
ASML	1984	2202	4186
Applied Materials	1912	1868	3779
Tokyo Electron LTD.	1893	1481	3374
KLA-Tencor	812	867	1679
Lam Research Corporation	809	752	1561
Dainippon Screen Mfg. Co., Ltd.	673	591	1265
ASM International N.V.	554	625	1179
Nikon Corporation	636	308	944
Novellus Systems, Inc.	403	339	741
Teradyne, Inc.	319	344	663
Advantest Corporation	269	326	594
Varian Semiconductor Equipment	266	328	594
Kulicke & Soffa	200	289	489
Hitachi Kokusai Electric	217	223	440
Hitachi High-Technologies Corporation	261	153	414
others	2794	2828	5622
	14001	13524	27525

Source: Company financials, VLSIresearch

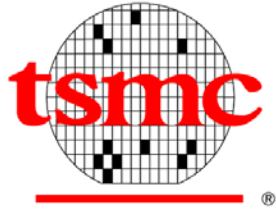
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VLSIresearch – The Chip Insider®



ASML

We service 12 biggest Semiconductor Manufacturers



Technology
Collaboration Award



Preferred
Quality Supplier Award

TOSHIBA

'Good Partner' Award



Company	2011 Capex
	Estimate \$M
Samsung	9,100
Intel	9,000
TSMC group	7,650
Globalfoundries	5,400
Toshiba (incl. SanDisk)	4,113
Hynix Semiconductor	3,000
Micron Technology	2,800
United Microelectronics Group	1,800
STMicroelectronics	1,100
SMIC	1,000
Renesas	845
Elpida	716

Source: Gartner



Designing a complex system with partners

85% of material value is manufactured outside ASML

TOSHIBA

hynix

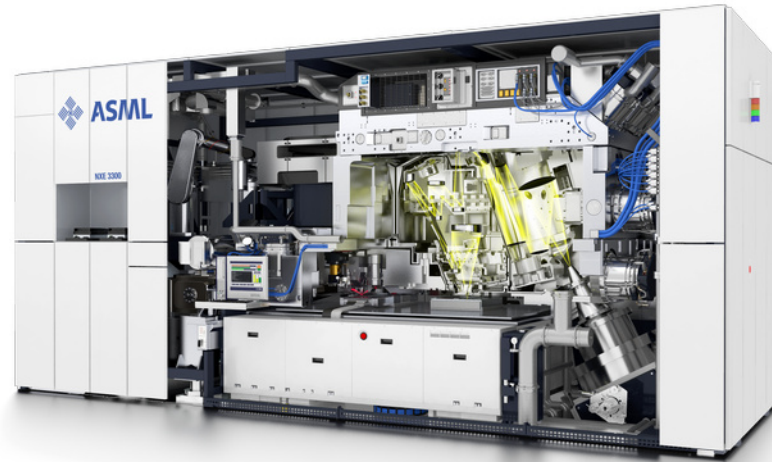


customers

PHILIPS



technology
partners



CARL ZEISS SMT

suppliers



SCHOTT
lithotec

academia



UNIVERSITY OF TWENTE



JOHANNES
GUTENBERG
UNIVERSITÄT
MAINZ



ASML

ASML has Employees, Customers, Suppliers and Supplier's Suppliers in Japan



has
acquired

iSuppli

Key Components / Materials

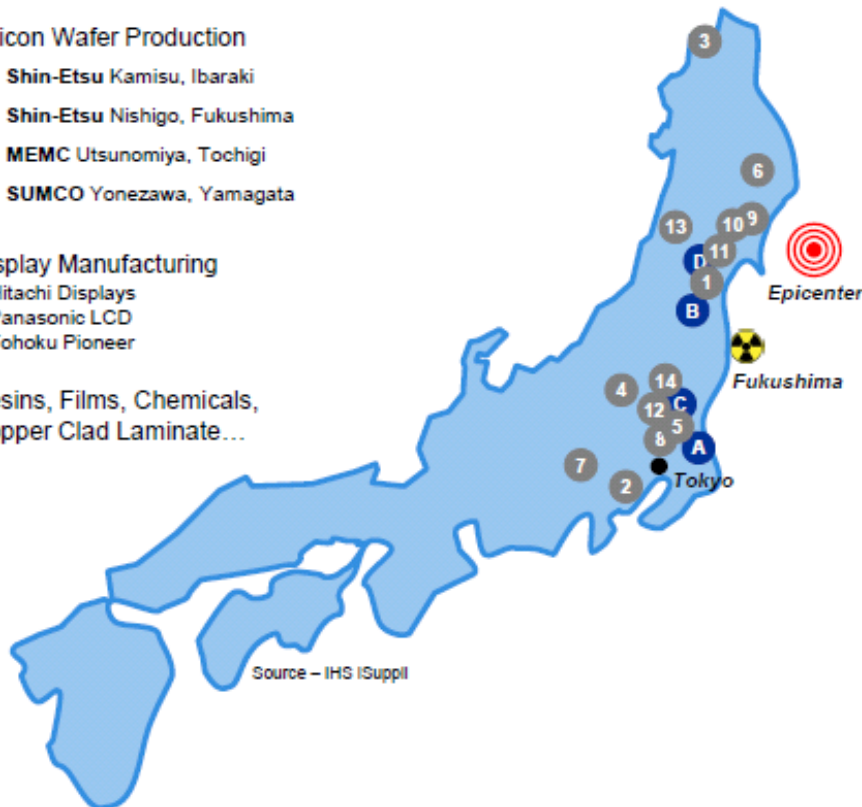
Silicon Wafer Production

- A** Shin-Etsu Kamisu, Ibaraki
- B** Shin-Etsu Nishigo, Fukushima
- C** MEMC Utsunomiya, Tochigi
- D** SUMCO Yonezawa, Yamagata

Display Manufacturing

- Hitachi Displays
- Panasonic LCD
- Tohoku Pioneer

Resins, Films, Chemicals,
Copper Clad Laminate...



Source – IHS iSuppli

Semiconductor Fabs

- 1** Aizu Wakamatsu, Fukushima
 - **ON Semiconductor** (Logic)
 - **Fujitsu** (Analog, Discrete, Memory)
 - **Texas Instruments** (Analog, Optical)
- 2** Atsugi, Kanagawa
 - **Mitsumi** (Analog, Logic)
- 3** Goshogawara, Aomori
 - **Renesas** (Logic)
- 4** Gunma
 - **ON Semiconductor** (Discrete, Logic)
 - **Renesas** (Analog, Discrete)
- 5** Hitachinaka, Ibaraki
 - **Renesas** (Logic, Micro, Memory)
- 6** Iwate
 - **Fujitsu** (Micro, Memory)
 - **Toshiba** (Discrete)
- 7** Kofu, Yamanashi
 - **Renesas** (Analog, Logic, Micro)
- 8** Miho, Ibaraki
 - **Texas Instruments** (Analog, Optical)
- 9** Miyagi
 - **Fujitsu** (Logic, Micro)
 - **Rohm** (Discrete, Micro)
- 10** Sendai, Miyagi
 - **Freescale** (Logic)
- 11** Shiroishi, Miyagi
 - **Sony Semiconductor** (Logic)
- 12** Tsukuba, Ibaraki
 - **Rohm** (Discrete)
- 13** Tsuruoka, Yamagata
 - **Renesas** (Logic)
- 14** Utsunomiya, Tochigi
 - **Matushita** (Discrete)

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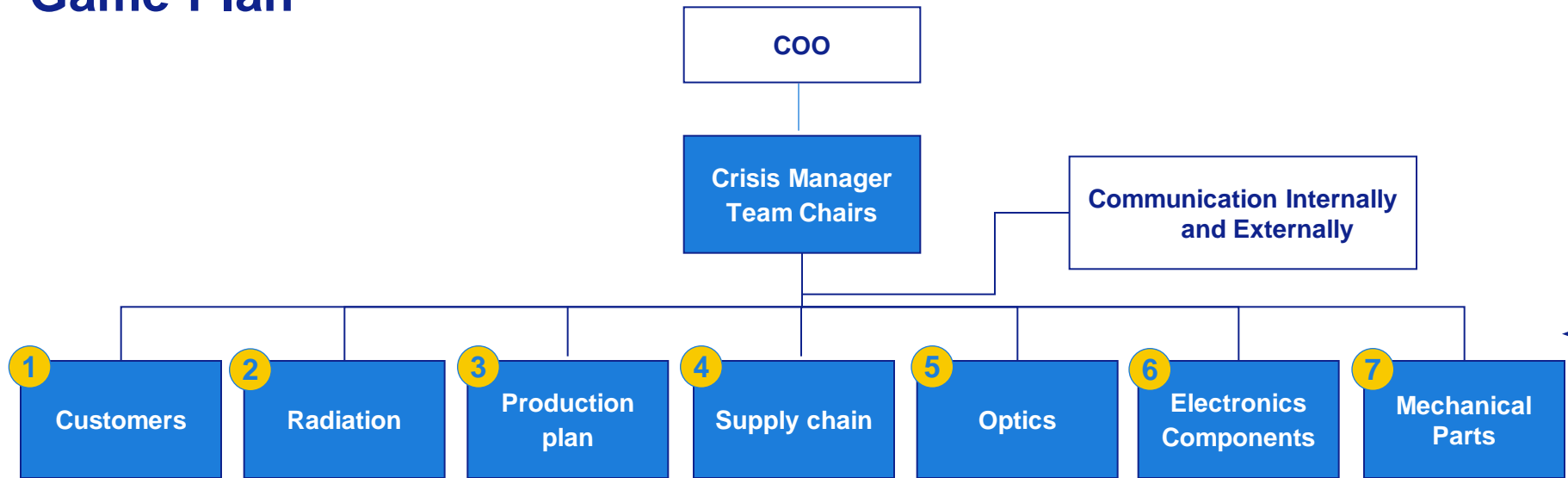


Introducing ASML

Dependencies in Value Chain

Containing the Risk of Japan Earthquake

Game-Plan



- Assign crisis manager with direct line to COO
- Install Temporarily Program Structure with Tiger Teams; War-room Style Management
 - Daily carrousel with every tiger team
 - Solution oriented approach; Bold decisions in case needed

Note: First priority was safety of our own people; dealt with in separate group

Main Challenges of Team

① Customers

- Road infra destroyed; Circumvent Narita Airport, Reroute through Domestic Airports
- Proactively send earthquake sensitive spare parts; use lessons learned from Taiwan
- Find capacity to Install systems at customers outside affected areas in Japan

② Radiation

- Fear of radiation related to Fukushima; secure safety for ASML related transports

③ Production Plan

- Avoid idle time in fully loaded factory; Change machine configs; Re-slot systems

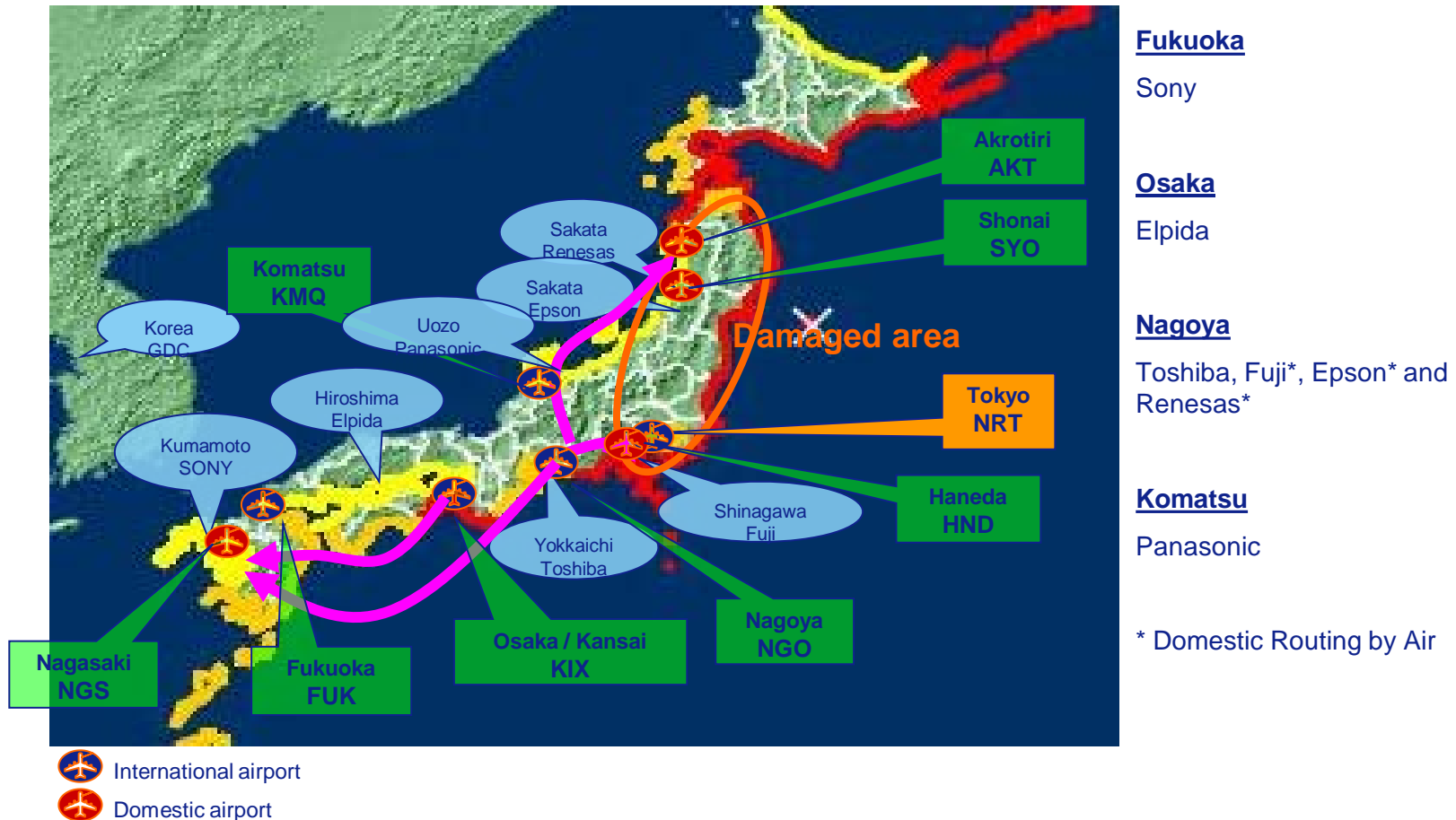
④ Supply Chain

- Resolve late deliveries in regular operations;
- Assess need for dedicated teams

⑤ Optics, ⑥ Electronics Components, ⑦ Mechanical Parts

- Cross sector tiger teams for impacted supply chains

① Replace Road Transport by Domestic Air to reach Local Offices and Customers (1st wk of the crisis)



- In the first week we brought our local warehouses up and running and worked with 3PLs to make maximum use of domestic airfreight
- We sent earthquake sensitive spare parts based upon lessons learned Taiwan
- Our local service organization restored machines at our customer within the first week

2 Containing Risk of Radiation

Measurement of Radiation Dose around the Metropolitan Airports



Measured dose

http://www.mlit.go.jp/koku/koku_th7_000003.html

	Measurement points	Apr.6 PM	Apr.7 AM	Apr.7 PM	Annual exposure calculation
Narita Airport	Narita Airport	0.132 μ Gy/h 19:00	0.126 μ Gy/h 10:00	0.130 μ Gy/h 19:00	≈ 0.000130 mSv/h 1.14 mSv
Haneda Airport	Haneda Airport (Ukishimacho, Kawasaki City.)	0.098 μ Gy/h 19:00	0.096 μ Gy/h 10:00	0.095 μ Gy/h 19:00	≈ 0.000095 mSv/h 0.83 mSv

1) According to the website of Tokyo-Electric Power Company, the unit is converted as follows;

1 micro-Gray/hour (μ Gy/hr) \approx 1 micro-Sievert /hour (μ Sv/hr).

2) "Annual exposure calculation" is the estimation under the condition that the hourly radiation dose measurement at the measurement point is accumulated for 24 hours throughout the year.

3) 1 milli-Sievert (mSv) = 1000 micro-Sievert (μ Sv)

According to the Ministry of Education, Culture, Sports, Science and Technology, examples of exposure level of radiation in daily life is as below.

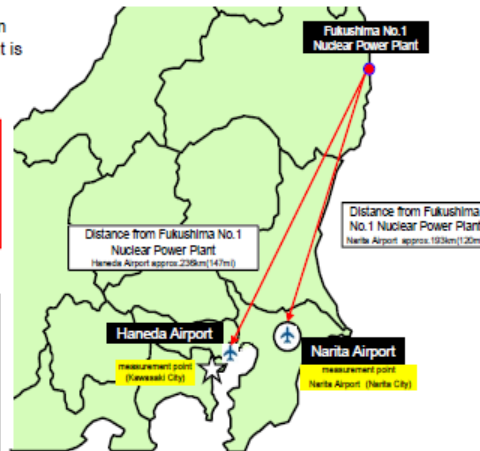
- Chest X-ray (once) 0.05 mSv
- 1 roundtrip between Tokyo and New York by air 0.2 mSv
- Stomach X-ray (once) 0.6 mSv

According to the WHO, a person is exposed to approximately **3.0 mSv/year** on average.

References;

○	NARITA INTERNATIONAL AIRPORT CORPORATION Website http://contents.narita-airport.jp/narita/en/222.pdf
☆	Kanagawa Environmental-radiation Monitoring-system Website(Japanese only) http://www.atom.pref.kanagawa.jp/cgi-bin/2/telemeter_diat.cgi?Area=1&Type=W

Radiation Measurement Map



- **Mar-29:** 8 airlines perform 100% outbound check in Japan, no excursions found.
- **Mar-30:** No excursions at Japan airports or EU-US airports. EU demands statements from Japan on region of origin food
- **Mar-31:** Email update service on Japan situation from Dutch foreign Affairs implemented
- **April 1:** no excursions reported
- **April 4:** No excursions reported, transportation back to normal
- **April 5:** No excursions

- Define policy with radiation experts → rely on contamination measurements at airports
- Follow up daily with measurements in Japan and relevant airports in Europe and USA
- Have policy verified with employers organization on due diligence
- Have local warehouses in Japan blocked for international outbound shipments
- Maintain policy until Fukushima is declared safe



ASML

4 Following up with Material Deliveries

1 List deliveries planned
1st tier Japanese suppliers

Contingency for risk parts

Info ASML employees


Letter to 169 Suppliers

Central .xls

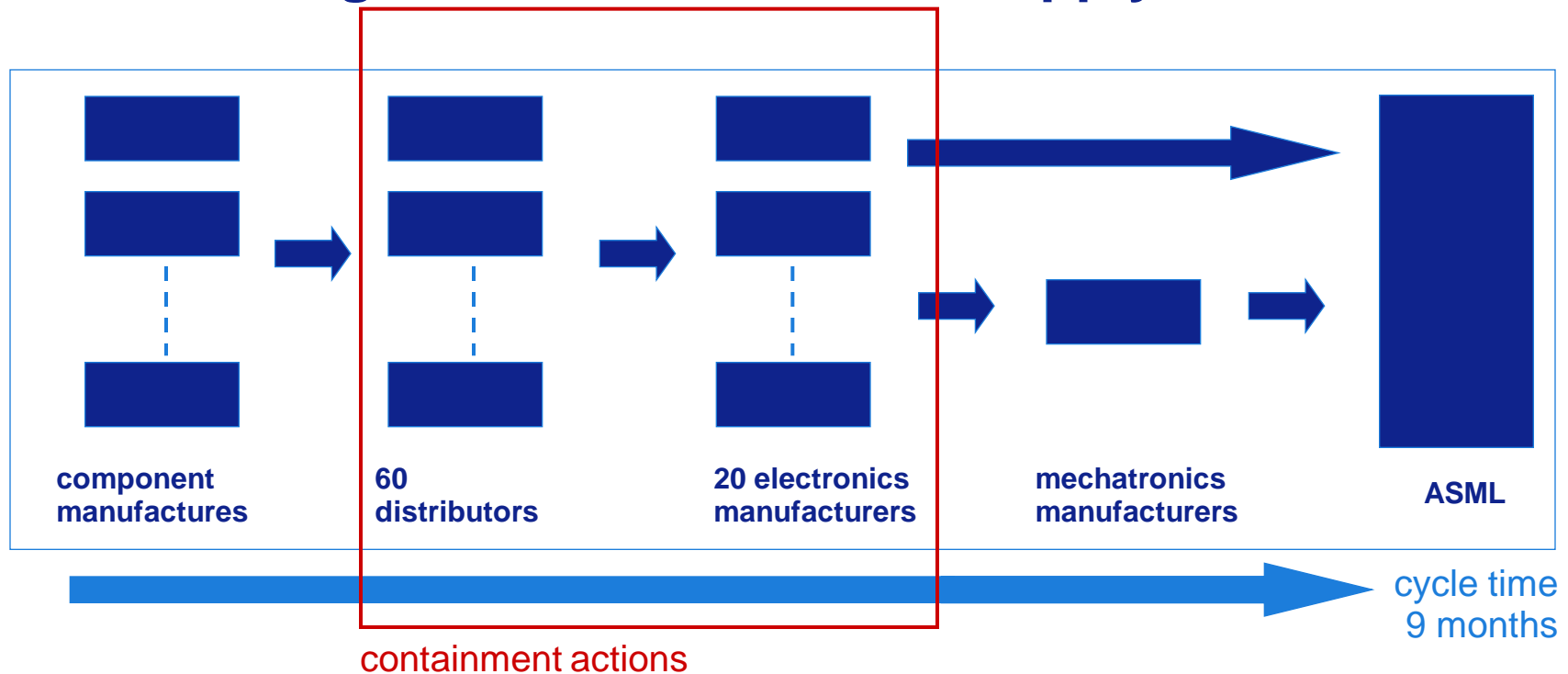
Risk Assessment

- 1. Supply impacted (1st or n tier)**
=> Tiger Teams to secure deliveries
- 2. Supply not impacted 1st tier
n tier unclear**
=> daily check for new updates
- 3. Supply not impacted (1st tier
and n tier)**

[illegible]

- Various sources used to categorize suppliers (especially n-tier) on risk; Daily update of database
 - Based on feedback we installed dedicated tiger teams for optics materials; electronics components and mechanical parts
- 

6 Containing Risks in Electronics Supply Chain



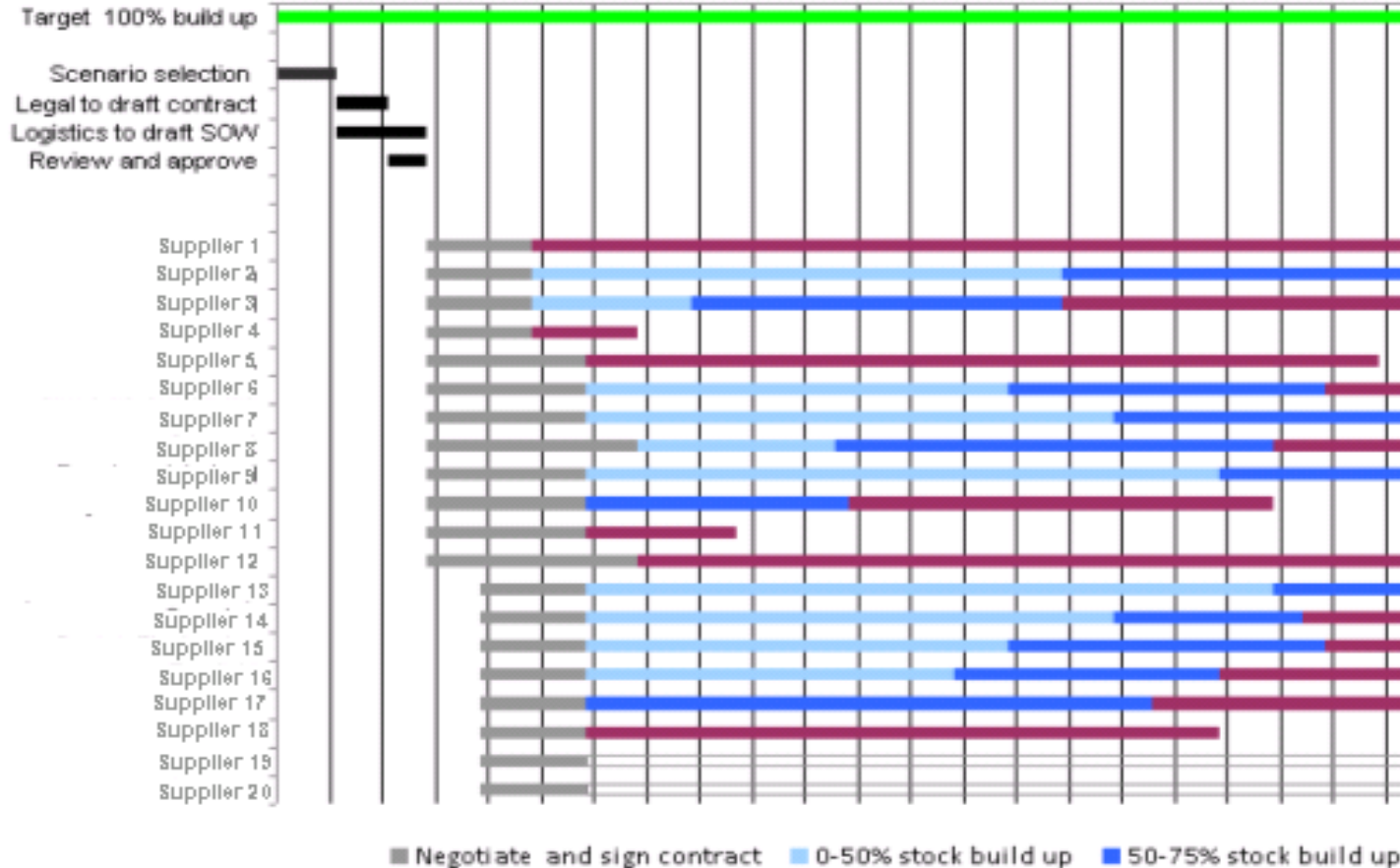
- ASML specifies thousands of components (white box design); others, usually less complicated, are specified by suppliers (black box designs)
- For white box designs we know manufacture, but not the production facility

Way forward

- Inform 60 distributors every month on ASML needs
- Secure 3 months iron inventory of all white box and black box designs at 20 biggest electronics manufacturers (> 90% of all components used by ASML)

6

Build 3 Month Inventory with 20 Electronics Suppliers



- 3 months inventory for all components at 20 suppliers in place; regular follow up using stock audits
- Contracts for hard allocation of supplier stock to ASML



7

Containing Risks in Mechanical Supply Chain

ASML specific components

19,170

Manufacturers

Japanese origin
1,014

Risk profile

20
839 parts

of which 710 parts from xxx; all fabs up and running no impact reported

4
175 parts

Risk suppliers

Supplier A
113 comp

Supplier B
12 comp

Supplier C
40 comp

Supplier D
10 comp

Risks reported by 5 suppliers, additional commitment provided to secure capacity

Risks reported by 2 suppliers, additional commitment provided to secure capacity

Risks reported by 2 suppliers, alternatives available

Tiger team focused on materials from destroyed fab

Next steps

Filtering reduced impact from 19,170 parts down to 175; and again down to 10

7 Mapping Japanese Mechanical Part Supplier with 1st tier

Supplier A
12 comp.

41 buy parts, 40
active, POs for
21 parts open

Supplier B
113 comp

67 buy parts, 60
active, POs for
15 parts open

Supplier C
40 comp

14 buy parts, 10
active, POs for
3 parts open

Supplier D
10 comp

17 buy parts, 12
active, POs for
6 parts open

ASML 1st tier Supplier

nth tier Supplier A-D

	Sup A	Sup B	Sup C	Sup D
1 st tier supplier 1	x		x	
1 st tier supplier 2	x			x
1 st tier supplier 3	x		x	x
1 st tier supplier 4	x			
1 st tier supplier 5	x			
1 st tier supplier 6	x		x	
1 st tier supplier 7	x	x		
1 st tier supplier 8	x			
1 st tier supplier 9				x
1 st tier supplier 10			x	
1 st tier supplier 11	x	x		
1 st tier supplier 12	x	x		
1 st tier supplier 13				x
1 st tier supplier 14				
1 st tier supplier 15	x			
1 st tier supplier 16				
1 st tier supplier 17	x	x		
1 st tier supplier 18			x	
1 st tier supplier 19	x			
1 st tier supplier 20	x	x		
1 st tier supplier 21	x		x	
1 st tier supplier 22	x			
1 st tier supplier 23			x	
1 st tier supplier 24			x	

- Technical teams worked with ASML model shop and other suppliers to contain risk of late delivery



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Introducing ASML

Dependencies in Value Chain

Containing the Risk of Japan Earthquake

Lessons Learned

Lessons Learned

- We are all vulnerable for natural disasters, but it also unleashes great energy to make big steps fast; War-room style structure with dedicated tiger teams worked and is now used in more areas
- Our market position brings a great responsibility to our customers and we cannot rely on 1st tier suppliers alone to contain risks deep in our supply chain; Dual sourcing deeper in the supply chain got a positive impulse
- For all critical materials we are storing bills of processes in a database up to 7th tiers deep and we have dedicated teams to work on improvement projects with critical supplier supply chains as a standard
- We have been able to contain the risk of the earthquake in Japan w/o any loss of production

What will the world look like when he grows up?



ASML